

July 11, 1997

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/847017.sch

Message 2:

From spo\_patent@spo.eds.com Wed Jun 17 09:14:05 EDT 1998

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Received: from spo.eds.com (www.spo.eds.com [192.238.49.35])

by mail1.uspto.gov (8.8.8/8.8.8) with SMTP id JAA29308

for <mayasyst@shell1.uspto.gov>; Wed, 17 Jun 1998 09:20:24 -0400 (EDT)

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id IAA03127 for mayasyst@shell1.uspto.gov; Wed, 17 Jun 1998 08:15:44 -0500

Received: from spo.spo.eds.com by spo1.spo.eds.com (4.1/SPOUUCP-2.3)

id AA06115; Wed, 17 Jun 1998 08:11:58 CDT

Received: from spo4.spo.eds.com by spo.spo.eds.com (4.1/SPO-2.6)

id AA17252; Wed, 17 Jun 1998 08:11:56 CDT

Date: Wed, 17 Jun 1998 08:11:55 CDT

Message-Id: <199806171311.AA19356@spo4.spo.eds.com>

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To: mayasyst@shell1.uspto.gov

Sender: spo\_patent@spo.eds.com

Subject: Re: 847017.sch

X-Mailer: SPO Mail

Mime-Version: 1.0

X-Spo-Ctl-Id: <19980617\_080636\_spo\_16974>

Content-Type: text/plain; charset=us-ascii

Status: RO

## CUSTOMER REQUEST SUMMARY

Your request was:

>e003

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>Word frequency list for document 847017

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>847017, Ciric L

>---search-id---

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>---word freq---

> 1 abstract                   1 accordance

> 1 according                 1 accordingly

> 7 active                   2 air

> 1 all                      4 also

> 1 alternate	44 and
> 3 angled	1 angles
> 1 another	1 apart
> 1 applications	10 are
> 7 area	3 array
> 1 attorney	1 automated
> 1 back	1 backgroundof
> 17 backlight	1 becomes
> 2 being	6 between
> 2 board	1 bonding
> 3 both	2 boundary
> 1 brief	1 brighter
> 1 called	8 can
> 1 cathode	4 chassis
> 3 circuit	1 circuits
> 1 color	2 combined
> 1 commercial	1 compact
> 1 compared	4 concentrated
> 7 concentration	1 configuration
> 2 connected	1 construction
> 1 consumer	9 conventional
> 18 corner	5 corners
> 2 corresponding	2 cross
> 1 crt	1 crystal
> 2 damage	1 damaging
> 1 dark	1 described
> 1 description	1 desirable
> 1 destroyed	4 device
> 8 devices	4 diagram
> 5 diffuser	1 diffusing
> 1 diode	1 disclosure
> 26 display	1 displayed
> 4 displays	4 distance
> 1 docket	1 dotted
> 1 drawings	1 during
> 1 each	1 effectively
> 1 electrically	1 element
> 3 elements	1 eliminate
> 1 embodiment	2 embodiments
> 1 emits	1 emitting
> 2 enclosed	1 enlarged
> 1 especially	1 every
> 1 example	1 examples
> 1 external	1 fieldof
> 15 figure	1 figures

> 1 film	1 filter
> 5 first	1 fitted
> 1 fitting	1 fixedly
> 1 flat	5 for
> 1 forces	1 form
> 28 frame	1 free
> 8 from	8 generally
> 12 groove	1 grooved
> 2 grooves	45 guide
> 1 guides	1 has
> 8 having	1 hold
> 2 holding	1 horizontally
> 1 illustrate	6 illustrating
> 2 image	1 imparted
> 1 improve	2 improved
> 5 include	2 included
> 9 includes	3 including
> 1 increase	2 inside
> 2 integrated	1 into
> 9 invention	1 known
> 6 lamp	18 lcd
> 1 lcds	8 least
> 1 led	79 light
> 1 lines	1 liquid
> 1 many	1 marked
> 13 may	1 middle
> 8 module	28 mold
> 1 more	1 moreover
> 10 mounted	1 movement
> 1 now	2 object
> 1 objects	9 one
> 1 opposite	2 order
> 4 other	1 outside
> 2 over	37 panel
> 1 panels	4 partially
> 1 particular	1 particularly
> 2 passive	3 pcb
> 1 picture	1 pixel
> 1 plurality	1 poor
> 2 portion	2 portions
> 1 possible	2 preferably
> 6 present	3 prevent
> 2 printed	1 prism
> 1 problem	1 project
> 1 projecting	18 projection

> 1 protecting	4 provide
> 1 provided	3 quality
> 1 ray	2 reaches
> 1 receive	4 reduce
> 4 reduced	4 referring
> 3 reflected	1 reflecting
> 1 reflection	1 relates
> 1 relation	1 relative
> 1 remote	1 repeated
> 2 result	1 revent
> 1 right	1 roove
> 12 rounded	2 rounding
> 4 second	2 sectional
> 1 send	1 sent
> 1 shaken	1 sharp
> 2 sheet	4 sheets
> 2 side	1 since
> 1 size	1 smaller
> 1 solve	1 some
> 10 source	1 space
> 1 spaced	1 still
> 7 substrate	1 such
> 1 summary	1 supplied
> 1 tab	1 tape
> 3 tft	4 that
> 137 the	1 theinvenbon
> 1 then	1 there
> 2 thereby	2 therefore
> 1 thereof	1 thereon
> 2 these	1 thin
> 5 this	1 through
> 2 thus	8 top
> 1 transistor	1 transmission
> 2 transmitted	1 tubes
> 1 two	13 unit
> 4 units	2 use
> 2 used	6 view
> 1 visible	1 well
> 3 when	1 wherein
> 6 which	1 while
> 1 widely	1 will
> 5 with	1 within
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Sales Order Summary:

Customer ID: 12310  
Sales Transaction Nbr: 129405  
Date Posted: June 17, 1998  
Product: E003  
Quantity: 50

E003 WORD FREQUENCY SEARCH REPORT

Classification Analysis:

1. 362/31      Total=25 ORs=11 XRs=14  
    Class 362    ILLUMINATION  
    Sub 31      EDGE LIGHTED PANEL
2. 349/65      Total=13 ORs=5 XRs=8  
    Class 349    LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
    Sub 56      PARTICULAR STRUCTURE  
    Sub 61      .Particular illumination  
    Sub 62      ..With integral optical element for guiding or  
                distributing light from the light source  
    Sub 65      ...Edge lit type light guide behind liquid crystal
3. 349/62      Total=12 ORs=5 XRs=7  
    Class 349    LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
    Sub 56      PARTICULAR STRUCTURE  
    Sub 61      .Particular illumination  
    Sub 62      ..With integral optical element for guiding or  
                distributing light from the light source
4. 362/26      Total=11 ORs=2 XRs=9  
    Class 362    ILLUMINATION  
    Sub 23      ILLUMINATED SCALE OR DIAL

- Sub 26 .Edge illuminated modifier or light rod/pipe
5. 349/58 Total=9 ORs=3 XRs=6  
Class 349 LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
Sub 56 PARTICULAR STRUCTURE  
Sub 58 .Holder, support, frame, or housing
6. 385/901 Total=7 ORs=0 XRs=7  
Class 385 OPTICAL WAVEGUIDES  
Sub 901 ILLUMINATING OR DISPLAY APPARATUS
7. 349/5 Total=5 ORs=4 XRs=1  
Class 349 LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
Sub 1 LIQUID CRYSTAL SYSTEM  
Sub 5 .Projector including liquid crystal cell (s)
8. 362/330 Total=5 ORs=0 XRs=5  
Class 362 ILLUMINATION  
Sub 317 LIGHT MODIFIER  
Sub 326 .Refractor  
Sub 330 ..Panel type
9. 349/64 Total=4 ORs=0 XRs=4  
Class 349 LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
Sub 56 PARTICULAR STRUCTURE  
Sub 61 .Particular illumination  
Sub 62 ..With integral optical element for guiding or  
distributing light from the light source  
Sub 64 ...Diffuser between light source and liquid crystal
10. 349/67 Total=3 ORs=2 XRs=1  
Class 349 LIQUID CRYSTAL CELLS, ELEMENTS AND SYSTEMS  
Sub 56 PARTICULAR STRUCTURE  
Sub 61 .Particular illumination  
Sub 62 ..With integral optical element for guiding or  
distributing light from the light source  
Sub 67 ...Reflector having particular shape behind light  
source
11. 353/122 Total=3 ORs=2 XRs=1  
Class 353 OPTICS: IMAGE PROJECTORS  
Sub 122 MISCELLANEOUS
12. 362/800 Total=3 ORs=0 XRs=3  
Class 362 ILLUMINATION

Patent Report:

Ref Patent Id Issue/File US Class (OR) Title

1 05719649 Feb 17 1998 349/65 Light guide and liquid crystal  
Jun 6 1995 display device using it

Inventor: Shono; Yasuo et al.

Assignee: Kabushiki Kaisha Toshiba

Abstract:

On a light exit surface which is the first principal plane of a light guide, multiple projections are fabricated in specific rows. These projections have light exit surfaces and continuous multiple slopes, and are fabricated from optically identical materials having the same refractive index as the substrate of the light guide. The slope farthest from the light entry edge surface is formed as a light exit surface, i.e., a surface which breaks the conditions for the total reflection of the incident light. On the other hand, the slope nearest the light entry edge surface which is the total reflection surface is formed such that the incident light is totally reflected.

✓ 2 05334993 Aug 2 1994 345/102 Liquid crystal display device  
Sep 3 1992

Inventor: Okajima; Hiroyuki et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A liquid crystal display device comprises a liquid crystal display panel, a light source for illuminating a back surface of the liquid crystal panel, a light guide for transmitting a light emitted by the light source to the back surface of the liquid crystal panel, a holding member for accommodating and fixing the light source at one end portion thereof and the light guide so that a surface of the light guide faces the back surface of the liquid crystal display panel, and a member for attaching the liquid crystal panel to the holding member so as not to disturb transmission of a heat emitting from the light source to the air through the holding member.

✓ 3 05027258 Jun 25 1991 362/31 Display unit  
May 4 1990

Inventor: Schoniger; Karl-Heinz et al.

Assignee: Inotec GmbH Gesellschaft fur Innovative Technik

Abstract:

An illuminated display unit such as a board with a house number



thereon or an advertising billboard, has a light guide panel. At least one electrical illuminating element is arranged in the vicinity of at least one lateral limiting edge thereof. The light guide panel serves for illuminating logo symbols, which are preferably in the form of film or of vapor coated layers, on the light guide panel. At least one of the lateral limiting edges of the light guide panel is provided with a light guide batten whose thickness is in excess of the thickness of the light guide panel and at least one of the illuminating elements is mounted in the batten. The transition between the light guide batten and the light guide panel is designed so as to have a high optical conductivity or transmittivity. The external surfaces of the light guide batten are provided at least partly with an inwardly reflecting layer. This makes it possible for the light of the illuminating elements, which are more especially in the form of LED's with a large diameter, to be fully introduced in substantially thinner light guide panels in order to reduce costs and weight.

4 05155612 Oct 13 1992 349/111 Liquid crystal display device with  
Jun 8 1990 light shield

Inventor: Adachi; Masahiro et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A transmission type or projection type liquid crystal display device includes a light source and an active matrix type liquid crystal display panel provided with a thin film transistor arrangement. A shielding film is included for cutting off light incident upon the thin film transistor arrangement from the light source. Electrode terminals of the liquid crystal display panel and outputs of driving LSI circuits are connected to each other by flexible substrates with the connected portions between the electrode terminals of the liquid crystal display panel and the flexible substrates protected by a connected portion protecting resin. The liquid crystal display device is further provided with a light shielding device for covering at least the protecting resin portion of the liquid crystal display panel, so as to prevent light of the light source from entering the region of the connecting portion protecting resin.

5 05489999 Feb 6 1996 349/62 Liquid crystal display device  
Jul 26 1994 having a circuit board disposed at  
a recess of a light guide plate

Inventor: Matsumoto; Takumi

Assignee: Sharp Kabushiki Kaisha

Abstract:

A liquid crystal display device comprises an edge light type of a light guide plate for a backlight, having an inclined surface. A back light lamp disposed in a side of a wide edge surface of the light guide

plate. A liquid crystal display panel disposed in a side of a rear surface of the light guide plate. A circuit board disposed at a recess of the inclined surface of the light guide plate. A tape carrier connecting the liquid crystal display panel and said circuit board with each other. And an integrated circuit disposed on the tape carrier for driving the liquid crystal panel.

6 05052783 Oct 1 1991 349/5 Projection type image display  
Oct 18 1989 apparatus

Inventor: Hamada; Hiroshi

Assignee: Sharp Kabushiki Kaisha

Abstract:

In a liquid crystal image display apparatus, an image of pixels of a liquid crystal display panel are projected onto a projection surface. The apparatus includes a light source, the liquid crystal display panel, microlens arrays provided respectively at a side of the liquid crystal display panel facing the light source and at another side thereof facing the projection surface, and a condenser lens provided between the light source and the microlens array located at the light source side of the display panel. The microlens arrays include a plurality of microlenses provided in positions corresponding to the plurality of pixels of the liquid crystal display panel, and pitches of the microlenses of the microlens array at the light source side are set to be larger than pitches of the pixels, while the pitches of the microlenses of the microlens array at the projection surface side are set to be smaller than those of the pixels.

7 05050046 Sep 17 1991 362/26 Surface lighting apparatus  
Jul 26 1989

Inventor: Tada; Masahiko

Assignee: Mitsubishi Denki Kabushiki Kaisha

Abstract:

In a surface lighting apparatus (13), a light guide (11) of transparent plastic plate has two trapezium shaped top parts, each having cylindrical holes (11a), (11g) wherein incandescent lamps (9) (10) are mounted, and a reflecting frame (12) having reflective inner walls is disposed closely around the light guide (11), and the light emitted from the incandescent lamps (9) (10) illuminate the LCD (4) uniformly, as backlighting apparatus.

8 05394308 Feb 28 1995 362/31 Lighting apparatus having  
Mar 3 1994 asymmetric light intensity  
distribution of compensating for  
low contrast ratios of LCD panel

Inventor: Watanabe; Takahiko et al.

Assignee: NEC Corporation

Abstract:

A lighting apparatus for illuminating a liquid crystal display (LCD) panel from behind is disclosed, wherein the LCD panel, when illuminated uniformly, exhibits asymmetric contrast ratios as viewed in a vertical direction. The apparatus comprises a light guide panel having a multitude of light reflecting dots on a reflecting surface opposite to the LCD panel, and a light source for injecting light into the light guide panel in a horizontal direction through a first edge of the light guide panel, so that the light propagates through the light guide panel toward the opposite edge of the panel and irregularly reflects off the dots toward the liquid crystal display panel. The light reflecting dots in a lower portion of the reflecting surface have a lower density than those in an upper portion of the reflecting surface, and each of these portions of the reflecting surface has a density increasing as a function of distance from the first edge of the light guide panel so that the LCD panel has equal brightness at the upper and lower portions when viewed at an angle substantially equal to 90 and an angle smaller than 90, respectively.

9 04767193 Aug 30 1988 349/62 Display unit with bent fluorescent  
Dec 24 1985 lamp

Inventor: Ota; Makoto et al.

Assignee: Mitsubishi Denki Kabushiki Kaisha

Abstract:

A new type of display unit is provided. A light emitting body such as a fluorescent lamp is disposed behind an elongated display panel. The middle section of the fluorescent lamp extends parallel to the elongated display panel to face it from end to end. The opposite ends of the lamp are bent if necessary.

10 05640216 Jun 17 1997 349/58 Liquid crystal display device  
Apr 7 1995 having video signal driving  
circuit mounted on one side and  
housing

Inventor: Hasegawa; Kaoru et al.

Assignee: Hitachi, Ltd. et al.

Abstract:

Herein disclosed are a liquid crystal display device and a data processing device, which can have their frame portions reduced in area to reduce the size and weight by extracting the terminals of video signals to only one side of a liquid crystal display panel and by arranging a video signal line driving circuit substrate to be connected with the terminals, only at one side of the display panel.

11 05711589 Jan 27 1998 362/31 Plane light source unit

Apr 10 1996

Inventor: Oe; Makoto et al.

Assignee: Mitsubishi Rayon Co., Ltd.

Abstract:

A plane light source unit which may be advantageously used as a backlighting means for a liquid crystal display device, and which includes a transparent light guide having a side end surface as a light incident surface, a surface perpendicular to the light incident surface as a light emitting surface, and a light reflecting layer provided on an opposite surface to the light emitting surface; and a second element having a large number of prism units formed on the light emitting surface of the transparent light guide which receives the light emitted from the transparent light guide and emits the light in a predetermined direction; wherein at least one of the light emitting surface and the opposite surface of said transparent light guide has a directional light emitting function which emits the incident light from the light incident surface of the transparent light guide in an oblique direction to the incident light and has a regulation function which makes the luminance of the light through the light emitting surface uniform over the whole surface thereof.

12 05313318 May 17 1994 349/65 Internal frame for a liquid  
Nov 4 1991 crystal display not extending to  
the upper surface thereof, light  
guide and circuitry assembly

Inventor: Gruenberg; Eric I. et al.

Assignee: Apple Computer, Inc.

Abstract:

This invention provides a thin, light assembly for a LCD, light guide and circuitry by using an internal frame with a central opening, above which is mounted a LCD and below which is mounted a light guide for directing light through the opening into the display. To one side of the light guide is mounted a light bulb for introducing light into the light guide. The internal frame also supports mounting of circuitry adjacent and coupled to the LCD.

13 05029045 Jul 2 1991 362/26 Surface lighting apparatus  
Aug 4 1989

Inventor: Sanai; Yukiharu et al.

Assignee: Mitsubishi Denki Kabushiki Kaisha

Abstract:

A surface lighting apparatus for backlighting a liquid crystal display panel(LCD) (4) has a light guide (11) for evenly illuminating back face of the LCD, the light guide comprising: an incidence plane wherefrom light beams from light source come in; a front face disposed vertical to the incidence plane wherefrom the light beams are out; and a curved back face

whereon light reflecting layer is formed for reflecting the light beams to the front face.

14 05764845 Jun 9 1998 385/146 Light guide device, light source  
Jun 24 1994 device, and liquid crystal display  
device

Inventor: Nagatani; Shinpei et al.

Assignee: Fujitsu Limited

Abstract:

An object of the present invention is to provide a light guide device which can emit light rays of high directivity with high efficiency irrespective of incident angles, and a light source device using the light guide device which can provide light rays of high directivity with high efficiency irrespective of emitting characteristics of light source lamps, and a liquid crystal display device which is small-sized and can display at very high luminance and is free from color tone changes depending on visual angles over a wide field angle. A substantial point light source is contained in a reflection box having an inside wall coated with a silver reflecting surface and an opening in the shape of a pinhole formed in a surface of the reflection box, and the light guide device is provided in the pinhole-shaped opening. The light guide device is a cylindrical transparent body. An incident end surface of the light guide device has a 1 mm-diameter, and an exit end surface of the light guide device has a 6.2 mm-diameter and a 100 mm-length. Source light from the substantial light source enters the incident end surface of the light guide device through the pinhole-shaped opening, repeats total reflection within the light guide device to exit at the exit end surface in light rays of high directivity of about 10.

15 04770525 Sep 13 1988 353/122 Liquid crystal projector  
Mar 12 1987

Inventor: Umeda; Osamu et al.

Assignee: Casio Computer Co., Ltd.

Abstract:

In a liquid crystal projector wherein a light source is arranged behind a transmission liquid crystal display panel having a rectangular display portion, an image displayed on the liquid crystal display panel is enlarged by a projection lens, and an enlarged image is projected on the screen located in front of the liquid crystal display panel, a linear Fresnel lens is arranged between the light source and the liquid crystal display panel to narrow illumination light beam from the light source along only the widthwise direction of the rectangular display portion. When the illumination light beam from the light source is narrowed along only the widthwise direction of panel, the amount of unused light beam emitted outside the long sides of the display portion can be reduced, and

the light beam from the light source can be effectively utilized for image projection.

16 05042921 Aug 27 1991 349/9 Liquid crystal display apparatus  
Oct 23 1989

Inventor: Sato; Makoto et al.

Assignee: Casio Computer Co., Ltd.

Abstract:

In order to effectively use light from a light source, the light from the light source is split into P-polarized light and S-polarized light by a splitter or the like. The split P-polarized light is directly incident on a liquid crystal display apparatus for displaying an image by using P-polarized light. The split S-polarized light is optically rotated by a wavelength plate or the like and converted into P-polarized light. This P-polarized light is also incident on the liquid crystal display apparatus. The liquid crystal display apparatus effectively utilizes the light from the light source and displays an image with high luminance.

17 05341231 Aug 23 1994 349/63 Liquid crystal display device with  
Dec 3 1992 edge lit lightguide reflecting  
light to back reflector by total  
internal reflection

Inventor: Yamamoto; Yoshitaka et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A reflective type liquid crystal display device excelling in uniformity and capable of making a bright display is presented. At the front side of the liquid crystal display element, that is, at the observer side, a light guide plate is disposed, and a pair of lamps are disposed at the outer side of the confronting side surfaces of the light guide plate. Collimators for limiting the incident angle to the upper surface of the light from the lamps are disposed between the light guide plate and lamps. That is, by the collimators, the incident angle to the upper surface is defined so that the incident light may be totally reflected, and that the reflected light may not be totally reflected by the lower surface 61b. As a result, the light from the lamps will not reach the observer directly, and a uniform illumination of the liquid crystal display element may be realized. Besides, at the observer side of the liquid crystal display element, a light guide plate forming protrusions is disposed, and a pair of lamps are disposed at the outer side of the confronting side surfaces of the light guide plate. Furthermore, between the light guide plate and lamps, collimators for limiting the incident angle of the light from the lamps into the upper surface are disposed. Accordingly, the light from the lamps does not reach the observer directly, and the light entering the protrusions formed on the light guide plate is emitted to the liquid

crystal display element side. Thus, a uniform illumination into the liquid crystal display element is realized.

18 05664862 Sep 9 1997 362/31 Edge light for panel display  
Aug 9 1996

Inventor: Redmond; William Franklin et al.

Assignee: Precision Lamp, Inc.

Abstract:

An edge light for projecting light into a lighting panel through an end surface of the lighting panel. The edge light includes a thin transparent optical guide member having an elongate portion and at least one end portion extending from the elongate portion. The elongate portion has a planar surface and a shaped surface generally parallel to the planar surface and configured for reflecting light within the guide member through one of the planar surface and the shaped surface. Either the planar surface or the shaped surface is positioned adjacent the end surface of the lighting panel when the edge light is used to illuminate the panel. The edge light also includes a light source positioned at the end portion for projecting light into the elongate portion of the optical guide member.

19 05666172 Sep 9 1997 349/58 Flat panel display device  
Apr 22 1996

Inventor: Ida; Kazushige et al.

Assignee: Kabushiki Kaisha Toshiba

Abstract:

One side wall of a liquid crystal display device (11) having a surface illuminant light source (backlight) is formed by one side wall (521) of an outer frame (bezel cover) (500) and a vertical wall of a lamp cover (850). In this liquid crystal display device (11), the lower end of the side wall (521) of the outer frame (500) and the upper end of the cover (850) are provided with bent ends (853, 523) and these bent ends (853, 523) engage with each other. In this way it is possible to make the display than and lightweight while maintaining ample rigidity. Also, the liquid crystal panel (100) is not readily damaged by shocks from outside. Furthermore, replacement of the linear light source (811) is extremely easy.

20 05746493 May 5 1998 362/31 Light guide for a display or  
Mar 8 1996 keyboard

Inventor: Jonsson; Anders et al.

Assignee: Ericsson Inc.

Abstract:

A light guide for illuminating a display and/or keyboard device is formed from translucent material as a planar element having a peripheral edge. A plurality of arcuately shaped light coupling recesses are formed

on one side to transmit light from light sources substantially uniformly into the light guide. A plurality of light reflecting recesses are formed in the peripheral edge to reflect light at the edge back into the light guide in a manner useful for illuminating the keys of the device.

- 21 05438484 Aug 1 1995 362/31 Surface lighting device and a  
Dec 3 1992 display having such a lighting  
device

Status: certificate of correction has been issued

Inventor: Kanda; Toshiyuki et al.

Assignee: Canon Kabushiki Kaisha

Abstract:

A surface lighting device receiving incident rays through two opposing faces of a light guide from light source to emit the incident rays from a face different from the two faces. The light guide is divided into plural divisions which are jointed together.

- 22 05664873 Sep 9 1997 362/97 Surface lighting device and a  
Jan 17 1995 display having such a lighting  
device

Inventor: Kanda; Toshiyuki et al.

Assignee: Canon Kabushiki Kaisha

Abstract:

A surface lighting device receiving incident rays through two opposing faces of a light guide from light source to emit the incident rays from a face different from the two faces. The light guide is divided into plural divisions which are jointed together.

- 23 05600462 Feb 4 1997 349/112 Optical film and liquid crystal  
Sep 14 1993 display device using the film

Status: certificate of correction has been issued

Inventor: Suzuki; Masaru et al.

Assignee: International Business Machines Corporation

Abstract:

The luminance within the viewing angle of an LCD device is increased by using an optical film of transparent material. The film has a first surface having a wave structure including a plurality of isosceles triangle prisms arranged side-by-side, and a second surface having an optically rough structure for performing diffuse transmission. The film may also have a first surface having a structure including a plurality of quadrangular prisms arranged side-by-side, and a second surface having an optically rough structure for performing diffuse transmission.

- 24 05541746 Jul 30 1996 349/62 Light source device for use in  
Oct 10 1995 liquid crystal projectors



Inventor: Hamagishi, Goro et al.  
Assignee: Sanyo Electric Co., Ltd.  
Abstract:

A light source device for use in liquid crystal projectors which comprises a reflector oriented toward a liquid crystal panel and having a reflecting surface formed by a paraboloid or ellipsoid, and a light source disposed at the focal position of the reflector. A converter is disposed on an optical axis extending from the light source to the liquid crystal panel for converging light emanating from the light source and reflected from the reflector in accordance with the size of an image display portion of the panel. The reflecting surface of the reflector has a great focal distance so that the spreading angle of the reflected light is not greater than 8 deg.

25 05608553 Mar 4 1997 349/61 Back light for a liquid crystal  
Apr 22 1996 display

Inventor: Kim; Kyung-sik  
Assignee: Samsung Display Devices Co., Ltd.  
Abstract:

A back light for a liquid crystal display (LCD) includes a mold part. A first lead frame is installed on the inside of the mold part. In the first lead frame, the light emitting diodes are uniformly spaced apart from one another and each light emitting diode includes a chip. A first electrode is formed on one side of the chip and attached to the first lead frame. A second electrode is divided into two parts and formed on the other side of the chip. A plurality of conducting layers are respectively disposed between the light emitting diodes and each conducting layer is attached to the first lead frame. A plurality of connecting members connect each second electrode with each adjacent conducting layer. A second lead frame is installed on the inside of the mold part to be adjacent to the first lead frame. The second lead frame is connected to the adjacent second electrode by one of the connecting members.

26 05550676 Aug 27 1996 359/599 Surface light source element  
Sep 6 1994

Inventor: Ohe; Makoto et al.  
Assignee: Mitsubishi Rayon Co., Ltd  
Abstract:

The present invention relates to a surface light source element used for a surface light source device, and in particular, to a surface light source element which can be used as a back light device for a liquid crystal display element. The surface light source element according to the invention is characterized in that at least one of the light emitting surface and the opposed surface of the transparent light guide has a directional light emitting function which radiates the incident light from

the light incident surface of the transparent light guide in an oblique direction to the incident light and has a regulation function which makes the luminance of the light uniform over the light emitting surface in the whole surface thereof. According to the present invention, it is possible to provide a very thin type of a surface light source element which can produce emitted light with a uniform and high luminance.

27 05070431 Dec 3 1991 362/31 Display board illuminating device  
Jul 30 1990 for passive displays

Inventor: Kitazawa; Hideki et al.

Assignee: Pioneer Electronic Corporation

Abstract:

A display board illuminating device includes a light guide plate arranged to face the back of a display board and a light source disposed to face the side end of the light guide plate. The side end of the light guide plate is inclined toward the center of the light guide plate in the direction of the display board. By this configuration an angle of an optical axis refracted at the surface of the side end and incident into the light guide plate with respect to a main surface of the light guide plate, so that the whole area of the display board is illuminated efficiently.

28 04915478 Apr 10 1990 349/65 Low power liquid crystal display  
Oct 5 1988 backlight

Inventor: Lenko; Daniel S. et al.

Assignee: The United States of America as represented by the Secretary of the Navy

Abstract:

A liquid crystal display panel having a backlight for providing high brightness, uniformity of illumination intensity, high efficiency, and long battery life, and which can be manufactured at a low cost. The display device includes a liquid crystal display panel, a light source for illuminating the liquid crystal panel, a light passage member which can be formed of a transparent material disposed between the liquid crystal panel and the light source. The light source inlet side of the light passage member is formed with a recess with the thickness being reduced at the region diametrically opposed to the light source. A light reflecting member reflects light from the light source. Within the photoconductor, two or more of the wedged shaped photo conductor can be used for increased area of coverage.

29 05764322 Jun 9 1998 349/65 Light guiding sheet, manufacturing  
Jun 24 1996 method thereof, back light using  
the light guiding sheet, and  
liquid crystal display unit using

the back light

Inventor: Mamiya; Johji et al.

Assignee: International Business Machines Corporation

Abstract:

A liquid crystal display unit using a back light uses a light guiding sheet to transfer to a liquid crystal display panel the light from a light source, and provides a liquid crystal display unit where a display of images is obtained with uniform brightness and high brightness. The light guiding sheet is formed by stacking two or more kinds of transparent amorphous layers different in refractive index at a predetermined angle with respect to a sheet surface. This light guiding sheet is constructed so as to be employed in a back light.

30 05467208 Nov 14 1995 349/67 Liquid crystal display  
Jun 1 1993

Inventor: Kokawa; Shozo et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A liquid crystal display including a sheet for converging light from a back light source. The sheet may be an array of truncated prisms, an array of prisms separated by flat portions, asymmetrical prisms with dual vertices, or prisms with different vertices.

31 05178447 Jan 12 1993 362/31 Edge light panel  
Jun 26 1991

Inventor: Murase; Shinzo et al.

Assignee: Kabushiki Kaisha Meitaku Shisutemu

Abstract:

There is provided an edge-illuminating emitter panel or edge light panel in a liquid crystal display device. The edge light panel includes a transparent resin substrate having an irregular reflection surface with a mesh pattern formed thereon. A mesh size of the pattern varies with the distance away from a primary light source which is juxtaposed with a side of the substrate. The side is so finished as to provide a rough surface for permitting light issued from the light source to effectively enter the substrate. The rough surface is continually formed along the side. The thus formed rough surface ensures the light incident on the side a sure entrance as well as a sure diffusion thereof, whereby the edge light panel improves the display device in brightness and uniformity of in display clarity. The rough surface may be formed intermittently or formed on at least a part of the side. The rough surface may be so formed as to have its roughness vary stepwise or continuously with the distance away from the light source.

32 05485354 Jan 16 1996 362/31 Flat panel display lighting system

Sep 9 1993

Inventor: Ciupke; Werner W. et al.

Assignee: Precision Lamp, Inc.

Abstract:

A flat panel display lighting system is disclosed wherein a thin, flat light guide has two spaced major surfaces with light introduced into one edge of the guide. Light is extracted from the light guide by the first facets in a plurality of parallel microgrooves disposed to intersect and transmit the light introduced into the light guide and reflected away from the major surface by reflection from second microgroove facets. A liquid crystal display is placed adjacent to the light guide to be backlit or frontlit.

33 05598281 Jan 28 1997 349/3 Backlight assembly for improved  
Nov 19 1993 illumination employing tapered  
optical elements

Inventor: Zimmerman; Scott M. et al.

Assignee: AlliedSignal Inc.

Abstract:

An improved backlight assembly comprising an array of apertures in close proximity to a light source, an array of tapered optical elements that have a light input surface area smaller than the light output surface area. Light rays pass through the apertures and are directed to the optical elements which transmit the light rays via internal reflection to provide a partially collimated light source. The light rays then pass through an array of microlenses that transmit the light rays via refraction and provide a substantially more collimated light source for the display elements of a display. The backlight assembly is advantageously used as a backlighting means for electro-optical displays, especially those designed for military and avionics applications.

34 05596429 Jan 21 1997 349/67 Liquid crystal display  
Jul 14 1995

Inventor: Kokawa; Shozo et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A back lighted liquid crystal display including a light converging assembly, a light-guiding plate, a reflecting plate, and a diffusing plate integrally welded together outside of the display area and a display having a housing configuration where horizontal and vertical integrated circuit driver chips are mounted on respective adjacent peripheral edge portions of a glass plate member of a liquid crystal panel and where an illuminating lamp is mounted for easy removal on an opposite edge from the edge portions where the driver chips are located.

35 04706173 Nov 10 1987 362/341 Lighting apparatus  
Feb 20 1986

Inventor: Hamada; Hiroshi et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

A lighting apparatus including a tubular light source and a member having a plurality of reflective surfaces which are angularly set such that light from the light source is reflected in a predetermined direction of a viewing angle by each of the reflective surfaces. A ratio of an apparent width of each of the reflective surfaces to an apparent interval of adjacent ones of the reflective surfaces, when viewed from the predetermined direction of the viewing angle, is so set as to be a function of a distance between the light source and each of the reflective surfaces.

36 05548348 Aug 20 1996 348/766 Distributed projection type liquid  
Dec 6 1994 crystal display device

Inventor: Kawabata; Hideyuki et al.

Assignee: Japan Aviation Electronics Industry Limited

Abstract:

Light from a light source 12 is incident to a transmission type liquid crystal display panel 11 and the light transmitted therethrough is incident to two reflecting surfaces 14a and 14b of a polygon mirror 14. A shield plate 16 is interposed between a line dividing the display surface of the liquid crystal display panel 11 into equal right and left surface areas and the marginal edge of the polygon mirror 14 along which its reflecting surfaces 14a and 14b adjoin. Light transmitted through the right-hand surface area of the liquid crystal display panel and light transmitted through its left-hand surface area are reflected by the reflecting surfaces 14a and 14b, respectively, and are further reflected forward by reflecting mirrors 21a and 21b for projection onto screens 17a and 17b by projection lenses 22a and 22b.

37 04914553 Apr 3 1990 362/32 Lighting device  
Sep 22 1988

Inventor: Hamada; Hiroshi et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

The lighting device is equipped with a light guide having a linear Fresnel reflection surface consisting of steps of continuously alternating reflecting surfaces having two different reflection angles. A light source is installed at one end of the light guide of the above construction so that the light from the light source is emitted from the irradiation surface of the light guide after being reflected by the linear Fresnel reflection surface.

38 05654779 Aug 5 1997 349/58 Liquid crystal display device  
Dec 29 1994 having a removable holding member  
for the light source

Inventor: Nakayama; Tatsuya et al.

Assignee: Mitsubishi Denki Kabushiki Kaisha et al.

Abstract:

A liquid crystal display device adaptable for various applications is provided which comprises a liquid crystal display panel, lamps, lamp holders respectively holding the lamps, a photoconductive board provided between the lamps, and a frame covering both the lamps and the lamp holders, wherein the photoconductive board comprises an outer photoconductive part fixed to the lamp holders, and an inner photoconductive part held on the rear side thereof by a holding member provided to the frame.

39 05040098 Aug 13 1991 362/31 Backlight for an electronic  
Apr 11 1990 display

Inventor: Tanaka; Akira et al.

Assignee: Fujitsu Limited et al.

Abstract:

A backlight having a reflection plate, a diffusion plate, a transparent light guide plate held between the diffusion plate and the reflection plate and having a reflection and diffusion surface adjacent to the reflection plate and a recessed light emitting surface adjacent to the diffusion plate, so that a space is defined between the recessed light emitting surface and the bottom surface of the diffusion plate adjacent thereto, a holder connected to the diffusion plate to define accommodation spaces between the opposite ends of the transparent light guide plate and the holder, and line light sources located in the accommodation spaces.

40 05680233 Oct 21 1997 349/61 Image display systems having  
Nov 28 1995 direct and projection viewing  
modes

Inventor: Faris; Sadeg M. et al.

Assignee: Reveo, Inc.

Abstract:

A transportable image display system having direct and projection viewing modes of operation. The image display system comprises a spatial light modulation structure for spatially modulating the intensity of light produced from a light source, and light diffusing panel of electro-optical construction having a light scattering state in which light being transmitted therethrough is scattered in a diffusive manner, and a light transmission state in which light being transmitted therethrough is transmitted without substantial scattering. In the illustrative embodiments, the spatial light modulation structure can be an

electrically-addressable LCD panel, or slide-film structures to be viewed. During the direct viewing mode, light produced from the light source is scattered by the light diffusing panel and spatial intensity modulated by the spatial light modulation structure to form a first image for direct viewing. During the projection viewing mode, light produced from the light source is transmitted through the light diffusing panel without substantial scattering and spatial intensity modulated by the spatial light modulation structure to form a second image for projection onto a projection display surface for projection viewing.

41 05045847 Sep 3 1991 345/84 Flat display panel  
Jan 18 1989

Inventor: Tarui; Hisaki et al.

Assignee: Sanyo Electric Co., Ltd.

Abstract:

The invention discloses a novel flat display panel suited for use with computer terminal equipment, television sets, or the like. The flat display panel first confines light in a core layer of a light wave guide, and then diminishes refractive index in part of the core layer by applying a specific voltage to it. Light transmitted from part of the core layer having diminished refractive index is then outputted outside from the light wave guide. Using the externally outputted light, the flat display panel displays figures. The flat display panel embodied by the invention minimizes the total thickness of the display panel itself. It effectively allows display of figures in a sizable visual area, and yet, allows display of figures at an extremely fast speed as well.

42 05552840 Sep 3 1996 348/751 Three dimensional projection  
Mar 11 1993 display reflecting divided  
polarized light on to reflective  
liquid crystal display elements

Inventor: Ishii; Yutaka et al.

Assignee: Sharp Kabushiki Kaisha

Abstract:

The present invention relates to a projection type liquid crystal display. In a preferred aspect, the projection type liquid crystal display of the invention includes an optical source for generating light, a light dividing unit which divides the light into a first light having a first polarization direction and a second polarization direction and allows the first and second lights to come out in different directions from each other, a pair of reflective liquid crystal display elements formed of a first reflective liquid crystal display element and a second reflective liquid crystal display element with synchronization, a light synthesizing unit for receiving the first light which comes out of the first reflective liquid crystal display element and the second light which comes out of the

second reflective liquid crystal display element and synthesizing the first and second lights into image light, and a screen.

43 05623392 Apr 22 1997 361/681 LCD assembly with projection  
Jun 4 1996 function

Inventor: Ma; Hsi-Kuang

Abstract:

A LCD assembly including a LCD stand having a base and a holder frame pivoted to the base, the holder frame having a light guide board; and a LCD adapted for mounting in the holder frame of the LCD stand, the LCD including a display screen unit, and a frame shell, the display screen unit including a liquid crystal display screen at the center, a lamp tube along one long side thereof adapted for providing back light to the liquid crystal display screen, a plurality of air vents at an opposite long side thereof, at least one fan on the inside adjacent to the air vents, and a circuit board along one short side thereof, the circuit board having a switch connected to the lamp tube and the at least one fan by electric wires for controlling their operation alternatively, and a connector adapted for connecting to a computer by a cable, the frame shell having a center opening corresponding to the liquid crystal display screen, and a peripheral flange adapted for covering over the lamp tube, the at least one fan, and the circuit board when the LCD assembly is used with a projector.

44 05703667 Dec 30 1997 349/65 Light guide plates and light guide  
Aug 8 1996 plate assembly utilizing  
diffraction grating

Inventor: Ochiai; Shin-Ichiro

Assignee: Shimada Precision, Co., Ltd.

Abstract:

A light guide plate is provided which utilizes the phenomenon of diffraction based on wave optics of light, and which can provide much higher and more uniform brightness over an entire illuminated surface than the brightness level achievable by the prior art and can assure longer battery life through reduced power consumption for a light source. The light guide plate consists of a transparent plate, at least on one end of which light rays from the light source fall. The light guide plate has a diffraction grating printed or worked on a bottom surface thereof such that at least one of a grating part width/non-grating part width ratio in unit-width or a sectional configuration of the diffraction grating is varied so as to enhance and uniform light intensity on a top surface of the light guide plate.

45 05150238 Sep 22 1992 349/5 Active matrix LCD projection  
Mar 4 1991 system with anti-reflective



characteristics

Inventor: Vogeley; James H. et al.

Assignee: nView Corporation

Abstract:

The projection system includes a light source, a lens for focussing the light rays, an active matrix LCD panel disposed and spaced between a pair of glass panels and a lens and mirror system for projecting the LCD image onto an enlarged surface. To minimize, eliminate or attenuate ghosting of the images caused by secondary reflections from the upper glass panel back onto the LCD, the undersurface of the upper glass panel is coated with a high-efficient, anti-reflecting material, such as including magnesium fluoride, whereby high-contrast ratio images are

maintained and not degraded by secondary reflections in the optical system.

46 05461547 Oct 24 1995 362/31 Flat panel display lighting system  
Jul 20 1993

Inventor: Ciupke; Werner W. et al.

Assignee: Precision Lamp, Inc.

Abstract:

A flat panel display lighting system is disclosed wherein a thin, flat light guide has two spaced major surfaces with light introduced into one edge of the guide. Light is extracted from the light guide by the facets in a plurality of parallel microgrooves disposed to intersect the light introduced into the light guide. A liquid crystal display is placed adjacent to the light guide to be backlit or frontlit.

47 05546203 Aug 13 1996 349/62 Liquid crystal display having a  
Oct 13 1993 frame which does not transmit  
light source heat to the display

Inventor: Takao; Yasunori

Assignee: Sharp Kabushiki Kaisha

Abstract:

A liquid crystal display device is provided with a heat releasing means. The heat releasing means is constructed such that a frame for fixing a liquid crystal display board to an illuminating device has a cutout formed in a position corresponding to a light source in order to expose a holding member of the light source for releasing heat. Alternatively, the heat releasing means is constructed by providing a metallic plate in a portion corresponding to the light source. With these means, it is possible to prevent local rise of temperature in the edge portion of the liquid crystal board.

48 05760849 Jun 2 1998 349/5 Liquid crystal display device and

Apr 24 1995

liquid crystal projection display  
device including means for  
controlling direction of light  
beams

Inventor: Omae; Hideki et al.

Assignee: Matsushita Electric Industrial Co., Ltd.

Abstract:

A liquid crystal display device comprises a light source, a diffusion plate for diffusing light beams emitted from the light source, and a liquid crystal panel for forming an image thereon as a result of a variation in scattering efficiency wherein the diffusion plate and liquid crystal panel are separately arranged with a distance between them, thereby the liquid crystal panel being illuminated by the diffused light beams uniformly, and a liquid crystal projection display device further comprises a color separator, a light deflector, a projector lens assembly and apertures having a shape similar to an image of the light source formed near the pupil of the projector lens assembly.

49 05550657 Aug 27 1996 349/62 Liquid crystal display device  
Sep 10 1993 having an optimized ridged layer  
to improve luminosity

Status: certificate of correction has been issued

Inventor: Tanaka; Akira et al.

Assignee: Fujitsu Limited

Abstract:

A planar illumination unit includes an optical guide layer for guiding light therethrough and emitting the light from a top surface, a light source fixture provided so as to face a side wall of the optical guide layer for injecting a light into the optical guide layer, an optical scattering layer disposed above the top surface of the optical guide layer for causing a scattering in the light that has been received from the optical guide layer, and a reflector provided on a bottom surface of the optical guide layer for reflecting the light incident to the optical guide layer, wherein the light source fixture includes a reflector for reflecting the light that has been produced by a light source in a direction primarily offset from the light source.

50 05743614 Apr 28 1998 353/122 Housing assembly for a matrix  
Jun 7 1995 display

Inventor: Salerno; Jack et al.

Assignee: Kopin Corporation

Abstract:

A housing is mountable on a carousel slide projector. The housing contains a movable light valve slide assembly that is coupled to a video signal source. The light valve slide assembly is movable between a

position within the housing and a position outside the housing. When mounted on the slide projector, the light valve slide assembly can be moved into the projection chamber of the slide projector. The video signal source transmits a video signal to the light valve slide assembly, where the video signal is converted to a drive signal to actuate pixels on the light valve. The light valve thus generates a video image that is projected onto a viewing surface. Preferably the light valve is an active matrix liquid crystal display.

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